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Nuclear polarizability effects at low and high excitation energies

Virtual excitations are responsible for the polarization of atoms and molecules and give rise to the well-known van der Waals forces between two neutral atoms or molecules, which are far enough apart for the overlap between the wave functions to be neglected. In nuclei, electric-dipole virtual excitations via high-lying states in the giant dipole resonance can also polarize the ground and excited states of nuclei. This polarization phenomenon is a second-order effect in Coulomb-excitation theory and is directly related to the static nuclear polarizability. At low energies, the nuclear polarizability affects quadrupole collectivity in light nuclei more substantially than previously assumed. Here we present Coulomb-excitation reorientation-effect measurements of the first 2+ states in 10Be and 12C together with ab initio calculations, and show how the nuclear polarizability may influence nuclear collectivity at higher excitation energies.

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